Docket No. 01-0423
Staff Exhibit 26

REBUTTAL TESTIMONY

OF

ALAN S. PREGOZEN, CFA

FINANCE DEPARTMENT
FINANCIAL ANALYSIS DIVISION

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY

Petition for Approval of Delivery Services Tariffs and Tariff Revisions and Residential Delivery Services Implementation Plan, and for Approval of Certain Other Amendments and Additions to its Rates, Terms, and Conditions

DOCKET NO. 01-0423

OCTOBER 2001

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WITNESS IDENTIFICATION

1. Q. Please state your name and business address.

A. My name is Alan S. Pregozen. My business address is 527 East Capitol Avenue, Springfield, Illinois, 62701

2. Q. What is your current position with the Illinois Commerce Commission?

A. I am presently employed as Manager of the Finance Department of the Financial Analysis Division.

3. Q. Please describe your qualifications and background.

A. In January 1983, I received a Bachelor of Arts degree in Economics and Political Science from the University of Illinois at Urbana-Champaign. In January 1985, I received a Master of Business Administration degree, with a concentration in Corporate Finance, from the University of Illinois at Urbana-Champaign. In September 1991, I earned the designation Chartered Financial Analyst from the Institute of Chartered Financial Analysts.

I have been in the employ of the Illinois Commerce Commission since March 1986. I was promoted to Senior Financial Analyst in October 1987, to Chief Financial Analyst in November 1989, and to Manager of the Finance Department in July 2000. I have previously testified before the Commission on a variety of financial issues.

4. Q. Do you belong to any professional organizations?

A. Yes. I am a member of the Association of Investment Management and Research.

INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

5. Q. What is the purpose of your rebuttal testimony in this proceeding?

A. The purpose of my rebuttal testimony is to respond to the rebuttal testimonies of Commonwealth Edison Company ("ComEd") witnesses Daniel Thone and Christopher Culp on the issue of the Miller and Hamada models. I will also address the criticism of credit ratings as indicators of risk inherent in common stocks presented in the rebuttal testimony of ComEd witness Sam Peltzman.

6. Q. Please summarize your recommendations.

A. Simplistic assumptions embodied in the ComEd Miller and Hamada models lead to inaccurate estimates of the impact of debt leverage on the cost of common equity. Although Ms. Freetly's analysis demonstrates that no leverage adjustment is needed in this proceeding, the effort expended addressing this issue compels me to request that the Commission affirm its decision in Docket Nos. 99-0120/99-0134 Cons., and reject adjustments to ComEd's cost of equity derived from the Miller and Hamada models. In addition, the Standard & Poor's ("S&P") corporate credit and business position ratings indicate that ComEd's operating risk has declined as a result of its restructuring as a delivery service provider. Given S&P's reputation as an independent and reputable assessor of risks, its assessment of ComEd's operating risk should be accepted over the opinions of Drs. Culp and Peltzman.

COMED MILLER AND HAMADA MODELS

7. Q. Dr. Culp argues that models should be evaluated on their ability to describe actual behavior rather than the realism of their assumptions.[1] Do you agree?

A. Yes. Nevertheless, the ComEd Miller and Hamada models fail this test. The models' assumption that a company can borrow at the risk-free rate biases their ability to measure the impact of debt leverage on a company's cost of common equity. Specifically, the ComEd Miller model measures the relationship between financial leverage and the cost of common equity as follows:

$$k_{e,l} = k_u + (k_u - k_d) \times \left(\frac{D}{E}\right) \times (1 - T) \qquad (1)$$

where: $k_{e,l}$ = cost of common equity for a levered firm;
k_u = cost of capital for an unlevered firm;
k_d = cost of total debt, including short-term debt;
D = amount of debt;
E = amount of common equity; and
T = corporate income tax rate.

Note that the lower the value of the cost of debt k_d, the greater the value of the term (k_u - k_d) and thus the greater the change in the cost of common equity of the levered firm $k_{e,l}$ for a given increase in financial leverage $\left(\frac{D}{E}\right)$. Since the risk-free rate is lower than the cost of risky corporate debt, the ComEd Miller (and Hamada) models produce upwardly biased cost of common equity estimates for financially leveraged firms.

8. Q. Have others recognized this bias?

[1] ComEd Ex. 30.0, p. 3.

A. Yes. The *Brealey and Meyers* text that Dr. Culp cites as an authority on the issue states, "As the firm borrows more, the risk of default increases and the firm is required to pay higher rates of interest. Proposition II predicts when this occurs the rate of increase in r_E [$k_{e,l}$] slows down… The more debt a firm has, the less sensitive r_E [$k_{e,l}$] is to further borrowing."[2,3] Modigliani and Miller, authors of the capital structure theory on which the ComEd Miller and Hamada models are based, also recognized that (1) the use of risk-free rate in their development of the Proposition II model[4] was a simplifying assumption; (2) that the interest rate on a firm's debt is positively related to the amount of financial leverage; and (3) as a consequence of (2), the cost of common equity will increase with financial leverage but at a decreasing rather than constant rate.[5] In contrast, because interest rates in the ComEd Miller and Hamada models are insensitive to the level of borrowing, those models assume that the cost of common equity increases at a constant rate with financial leverage.

9. Q. Why do you modify your references to the Miller and Hamada models with the word "ComEd?"

A. I am not implying that ComEd conjured up versions of the Miller and Hamada models that do not otherwise exist.[6] Rather, I use the modifier to distinguish amongst various

[2] ComEd Ex. 30.0, p. 2.

[3] Brealey and Myers, *Principles of Corporate Finance*, Sixth Edition, Irwin McGraw-Hill, 2000, p. 482. Hereafter referred to as *Brealey and Myers*. r_E is *Brealey and Myers*' designation for the expected return on common equity for a levered firm. *Ibid.* 481.

[4] The Modigliani and Miller's Proposition II model is that shown in Equation (1) but without the term for corporate income taxes (1 - *T*).

[5] Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," The American Economic Review, vol. 48, no. 3, June 1958, pp. 273-275 (Hereafter referred to as "*Modigliani and Miller*"); Miller, "The Modigliani-Miller Propositions After Thirty Years," Journal of Economic Perspectives, vol. 2, no. 4, Fall 1998, pp. 106-107.

[6] The Miller Model is actually as follows:

$$V_L = V_U + \left[1 - \frac{(1-T_C)\times(1-T_S)}{(1-T_D)}\right] \times D$$

where: V_L = value of a levered firm;

versions of those models. The ComEd Miller model adds corporate income taxes to a model known as "Modigliani-Miller Proposition II" ("MM II"). That is, MM II is Equation (1) but without the term (1 - *T*). MM II assumes that the cost of debt k_d equals the risk-free rate, as does Mr. Thone. Nevertheless, as both *Modigliani and Miller* and *Brealey and Myers* recognize, MM II can be modified to incorporate the risky corporate debt.

10. Q. Do the ComEd Miller and Hamada models fail to describe market behavior in other ways?

A. Yes. The ComEd Miller and Hamada models predict that the least-cost capital structure for a firm is comprised of 100% debt and 0% common equity. One only needs to examine the utility capital structure data presented in the testimonies of Mr. Thone and Ms. Freetly to realize how poor that prediction has been. None of the companies in any of the samples presented in this proceeding have capital structures that even approach that allegedly optimal level. Either the models' predictions are wrong or entire industries of companies are operating with sub-optimal capital structures. Thus, if Mr. Thone and Dr. Culp truly believe that the ComEd Miller and Hamada models accurately measure the change in the cost of common equity for a give change in financial leverage, consistency requires that they also embrace its conclusions regarding optimal capital structure; that is, ComEd's optimal capital structure comprises 100% debt. According to the ComEd Miller and Hamada models, ComEd has been

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V_U = value of an unlevered firm;
T_C = corporate income tax rate;
T_S = income tax rate on common equity investment;
T_D = income tax rate on debt investment; and
D = amount of debt.

(*Brigham and Gapenski*, p. 633.) I oppose use of the ComEd Miller model on the grounds that it produces unreasonable estimates of the impact of financial leverage on the cost of common equity, not because that model has been labeled incorrectly.

operating with an unreasonable capital structure, which would unfairly burden ratepayers with excessive utility rates.

11. Q. Does ComEd's optimal capital structure comprise 100% debt?

A. No. Nevertheless, that is exactly what the ComEd Miller and Hamada models predict. I oppose using the ComEd Miller and Hamada models for the purpose of setting utility's cost of capital or ~~any~~ component thereof, including capital structure, because the predictions of those models are so at variance with reality.

12. Q. How do the ComEd Miller and Hamada models imply that the optimal capital structure comprises 100% debt?

A. The ComEd Miller model is derived in part from the familiar formula for the after-tax weighted average cost of capital k_{WACC}:

$$k_{WACC} = k_{e,l} \times \left(\frac{E}{D+E} \right) + k_d \times \left(\frac{D}{D+E} \right) \times (1-T) \qquad (2)$$

The terms $\left(\frac{E}{D+E} \right)$ and $\left(\frac{D}{D+E} \right)$ represent the common equity and debt ratios, respectively. Substituting Equation (1) for the term $k_{e,l}$ in Equation (2) produces the following relationship between the weighted average cost of capital k_{WACC} the cost of capital of the unlevered firm k_u:

$$k_{WACC} = k_u \left[1 - T \times \left(\frac{D}{D+E} \right) \right] \qquad (3)$$

Equation (3) states that the after-tax weighted average cost of capital k_{WACC} equals the cost of capital of the unlevered firm k_u adjusted for the tax shield associated with debt.

According to Equation (3), at corporate income tax rates greater than 0, the greater the proportion of debt to total capital, the lower the after-tax cost of capital k_{WACC}. The after-tax cost of capital is minimized when the debt ratio $\left(\frac{D}{D+E}\right)$ equals one. The mathematical derivation of Equation (3) appears in Schedule 26.1.

13. Q. Does Schedule 26.1 demonstrate that the ComEd Miller model accurately measures the cost of common equity?

A. No. ComEd has defined the cost of debt k_d as the risk-free rate.[7] Neither ComEd nor any other utility can raise debt at the risk-free rate.

14. Q. Please demonstrate how using the risk-free rate in the ComEd Miller model implies that a utility can borrow at the risk-free rate.

A. Assume that a utility's unlevered cost of capital k_u equals 10%, the risk-free rate k_d equals 5%, the debt to equity ratio $\frac{D}{E}$ equals 1, and its corporate income tax rate T equals 40%. According to the ComEd Miller model, depicted in Equation (1), that utility's cost of common equity $k_{e,l}$ equals 13.0% as shown below:

$$k_{e,l} = 10\% + (10\% - 5\%) \times 1 \times (1 - 0.40) = 13.0\%.$$

Equation (3) shows that the after-tax cost of capital k_{WACC} corresponding to a 10% unlevered cost of capital, 40% tax rate and 50% debt ratio equals 8.0%:

$$k_{WACC} = 10\% \times [1 - (40\% \times 0.5)] = 8.0\%$$

[7] ComEd Ex. 8.0, pp. 15-16.

The cost of debt corresponding to the 8.0% after-tax weighted average cost of capital, 13.0% cost of equity, 40% tax rate, 50% debt ratio and 50% common equity ratio is found by solving Equation (2) for the cost of debt k_d as follows:

$$k_d = \frac{k_{WACC} - k_{e,l} \times \left(\frac{E}{D+E} \right)}{\left(\frac{D}{D+E} \right) \times (1-T)} = 5\%$$

The above example proves that using the risk-free rate as the cost of debt in the Miller model implies that a company can issue debt at the risk-free rate.

15. Q. Can the ComEd Miller and Hamada models be salvaged if the cost of risky debt is substituted for the risk-free rate?

A. Substituting the cost of risky debt for the risk-free rate would improve the ComEd Miller and Hamada models. Nevertheless, two difficulties remain. First, one would need to be able to measure the cost of risky debt at various levels of debt leverage. Unfortunately, determining the relationship between the cost of risky debt itself and financial leverage is not linear and is no easier to measure than the relationship between the cost of common equity and financial leverage. Second, as Ms. Freetly noted, measuring financial leverage is a far more complex process than ComEd's simplistic model implies.

16. Q. Your mathematical proof focused on the ComEd Miller model. Does it also apply to the ComEd Hamada model?

A. The ComEd Hamada model simply substitutes beta (**ß**) for the costs of the components of the capital structure *k*. This substitution is valid because the beta for a company's assets equals the weighted average of its debt beta and common equity beta. Of course, since ComEd's Hamada model assumes that utilities can raise debt at the risk-free rate and measures financial leverage in the same simplistic manner, the ComEd Hamada model is as poor an estimator of the relationship between debt leverage and the cost of common equity as ComEd's Miller model.[8]

17. Q. Dr. Culp describes Ms. Freetly's criticism of the ComEd Miller model's failure to incorporate the cost of debt in its definition of financial leverage as a "'cash flow volatility' and 'debt servicing cost' argument."[9] Is he correct?

A. No. Dr. Culp confuses the issue, which is not one of volatility of cash flows, as Dr. Culp supposes - ComEd's transitional funding notes bear fixed interest rates - but one of the quantity of debt cash outflows. In December 1998, ComEd issued $3.4 billion in debt at fixed interest rates approximately 50 basis points lower than it would have paid had it issued a similar amount of conventional debt. Clearly, for a given quantity of debt, the lower the fixed interest rate, the lower the resulting financial burden.

18. Q. Do you agree with Dr. Culp's assertion that "The mere fact that firms cannot borrow at the risk free rate is not a *prima facie* reason for rejecting the Miller Model."[10]

A. I agree. My rejection of the ComEd Miller and Hamada models is based on the close inspection that by definition goes beyond a mere *prima facie* review. As I have shown,

[8] ComEd Ex. 8.0, p. 18; Brigham and Gapenski, *Financial Management Theory and Practice*, 8th Edition, Dryden Press, 1997, p. 629. (Hereafter referred to as *Brigham and Gapenski.*)
[9] ComEd. Ex. 30.0, p. 7.
[10] *Emphasis in original*, ComEd Ex. 30.0, p. 3.

substituting the risk-free rate for the cost of risky debt has a profound, upward bias on the estimated cost of equity resulting from increasing financial leverage. This bias resulting from the ComEd Miller and Hamada models' risk-free rate assumption contrasts with the impact of heterogeneous expectations of the DCF model. Diversity in investor opinion does not systematically bias DCF estimates upward or downward.

19. Q. Please respond to Dr. Culp's claim that "*implications of the Miller model do not fundamentally change when we relax the assumption of equal borrowing costs.*"[11]

A. Dr. Culp is changing the debate from the ability of ComEd's Miller and Hamada models to accurately measure the effect on the cost of common equity of changes in financial leverage to the ~~implications~~ of the Miller and Hamada models, which are far more general.[12] Specifically, the Miller and Hamada models, or more accurately the MM propositions on capital structure, have one important implication: In perfect capital markets, capital structure and investment decisions are independent.[13] That is, the least cost capital structure is independent of operating risk and the value of the firm is independent of capital structure. This implies that the before-tax weighted average cost of capital does not change with financial leverage. In other words, Modigliani and Miller focused on the implications of capital structure for capital budgeting and cost of capital, not the precise change in the cost of common equity.[14]

[11] *Emphasis in original*, ComEd Ex. 30.0, p. 4.

[12] The focus of the Fama article that Dr. Culp cites in his argument also focuses on the issue of the irrelevance of capital structure on the value of the firm. (Fama, "The Effects of a Firm's Investment and Financing Decisions on the Welfare of its Security Holders," American Economic Review, vol. 68, no. 3, June 1978). Fama does not even mention the shape of the functional relationship between the cost of common equity and financial leverage, which is at issue in this proceeding.

[13] *Brealey and Myers*, pp. 490-491

[14] Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," The American Economic Review, vol. 48, no. 3, June 1958, pp. 274-275.

20. Q. Please respond to Dr. Culp's argument that a higher debt service obligation can put downward pressure on the expected return on common equity.[15]

A. Dr. Culp asserts that Ms. Freetly's example in which two otherwise identical firms have different interest costs implies that the assumption of perfect capital markets does not hold. Under that condition, Dr. Culp argues that investors may prefer higher interest payments to other uneconomic uses of free cash flow and that preference would lead to a lower cost of common equity.[16] Dr. Culp is wrong. First, Ms. Freetly's example does not necessarily imply imperfect capital markets. In fact, contrary to Mr. Thone's assertion,[17] Ms. Freetly's example is not only possible for companies in the same risk class but also observable. ComEd's own statement of capitalization is a prime example. The debt portion of ComEd's capitalization includes conventional debt, transitional funding notes ("TFNs"), and tax-exempt debt. Even ignoring the effects of issuance dates and terms to maturity, those debt instruments bear different interest rates that are unrelated to differences in risk class (i.e., operating risk) since ComEd, as a single entity, cannot belong in more than one risk class at one time. Nevertheless, ComEd issued transitional funding notes and tax-exempt bonds at lower interest rates than it would have paid on conventional debt. If one evaluates the effect of ComEd's financial leverage on its cost of common equity using the cost rate of these three different types of debt, one obtains three different estimates. This is illustrated in Schedule 26.2, which shows that the estimated cost of common equity and the cost of debt are inversely related. That is, at a given degree of financial leverage, the lower the cost of debt, the higher the estimated cost of common equity. That is nonsensical. More importantly, it directly conflicts with ComEd's testimony in Docket No. 98-0319. In that proceeding, ComEd witnesses assured the Commission that its proposed use of TFN proceeds

[15] ComEd Ex. 30.0, p. 4.
[16] ComEd Ex. 30.0, p. 5.
[17] ComEd Ex. 27.0, p. 12-13.

would be less of a burden on ComEd than conventional debt and would reduce its cost of common equity.[18] Yet, the lower cost TFNs lead to a higher cost of common equity under the ComEd Miller and Hamada models than conventional long-term debt. Thus, even if one were to accept Dr. Culp's rationalization as being reasonable under limited circumstances, ComEd's testimony in Docket No. 98-0319 indicates that rationalization is inapplicable to TFNs.

Even if one were to wrongly accept the premise that markets must be imperfect for Ms. Freetly's example of different interest rates to hold, Dr. Culp's hypothesis of why common equity investors might perceive lower risk in higher interest payments to lower interest payments is implausible. Dr. Culp implies that common equity investors would rather a company waste a given amount on uneconomic interest payments than other uneconomic expenditures. If true, common equity investors would prefer that a utility issue conventional debt rather than tax-exempt bonds because the lower debt servicing costs of the latter would increase the amount of cash flow available to managers to waste. The illogic of Dr. Culp's assertion is so clear that it requires no further explanation.

21. Q. What is your response to Dr. Culp's claim that "The Hamada model … and the Miller weighted average cost of capital … formulation are widely used and widely respected in academia and *practice* as being [sic] straightforward adjustments to incorporate leverage into cost of capital estimates"?[19]

A. Dr. Culp's statement is more interesting for the word it avoids than for the words it uses. That is, Dr. Culp uses the word "straightforward" rather than the word

[18] Order, Docket No. 98-0319, July 21, 1998 at 21-22.
[19] *Emphasis in original*, ComEd Ex. 30.0, pp. 1-2.

"accurate." Clearly, the models are "straightforward" in that they are easy to implement and directly relate changes in debt leverage and the cost of common equity.[20] Nevertheless, "straightforward" and "accurate" are not synonymous. The American Heritage Dictionary, fourth edition, 2000, defines "straightforward" as:

> **1.** Proceeding in a straight course; direct. **2a.** Not circuitous or evasive; honest and frank. See synonyms at **frank**[1]. **b.** Free from ambiguity or pretense; plain and open.

In contrast, that dictionary defines "accurate" as:

> **1.** Conforming exactly to fact; errorless. **2.** Deviating only slightly or within acceptable limits from a standard. **3.** Capable of providing a correct reading or measurement: *an accurate scale*. **4.** Acting or performing with care and precision; meticulous: *an accurate proofreader*.

The ComEd Miller and Hamada models are clearly inaccurate because they incorrectly assume that companies can borrow at the risk-free rate. Moreover, they do not accommodate the different types of debt that companies issue, such as securitized debt (e.g., transitional funding notes) and tax-exempt debt.

22. Q. Please respond to Dr. Culp's statement that "The Miller model prevents us from engaging in these sorts of 'my theory is better than your theory' arguments about what happens when the M&M [Modigliani and Miller] assumptions are violated. Most agree that it is better to stick with the original model, avoid such theoretical jousting and accept the transparency of the Miller model results for what they are - the best available approximation for how leverage affects a firm's equity cost of capital."[21]

[20] My agreement that the models are straightforward should not be construed as an admission that the Company's testimony in support of the models has been straightforward as well.

[21] ComEd Ex. 30.0, p. 6.

A. Mr. Culp's argument rests in part on unnamed people, most of which, he contends, support use of the ComEd Miller model. Clearly, *Brealey and Myers* are not among them. They recognize that risky corporate debt has clear implications for the model.[22] Even *Modigliani and Miller* note the impact of risky debt on the relationship between financial leverage and cost of common equity.[23] In Docket No. 98-0319, ComEd witness Dr. Willard T. Carleton, testified that "the mechanical use of any cost of capital model (Miller's or other), comparing pre-transitional funding with immediate post funding situation… does not lead to meaningful estimates of the impact of the financing on its long-term cost of capital."[24] At a minimum, Dr. Carleton's testimony implies that the Miller model does not accommodate TFNs easily.

In response to a Staff data request, Dr. Culp further explains his support for using the ComEd Miller model in this proceeding "still remains its widespread application as a model relatively free from modeler biases."[25] This amounts to a "better the devil you know" defense. Unfortunately, the "devil you know" is still a "devil." In this case that "devil" is a demonstrable inaccuracy in ComEd Miller and Hamada model estimates of the impact of increasing financial leverage on the cost of common equity.

23. Q. Please respond to Mr. Thone's assertion that "Ms. Freetly [argued] that TFNs should not be used in calculating leverage effects?"[26]

A. Mr. Thone mischaracterizes Ms. Freetly's testimony. Ms. Freetly did not state that TFNs should be excluded from Miller and Hamada model calculations. Rather, she noted that ComEd had argued that TFNs were less of a financial burden than

[22] Brealey and Myers, p. 482.
[23] Modigliani and Miller, pp. 273-275.
[24] Docket No. 98-0319, ComEd Ex. 7.0, p. 4.
[25] ComEd response to Staff data request JF-7.13.
[26] ComEd Ex. 27.0, p. 14.

conventional debt and that Miller and other cost of capital models do not produce meaningful estimates of the impact of TFNs on cost of capital.[27] Thus, when ComEd needed to reasonably demonstrate that its use of TFN proceeds would result in an overall reduction in cost of capital,[28] it argued that that Miller model does not accurately estimate the effect of TFNs on cost of common equity. Now that it received the Commission authorization to issue those TFNs, it argues that TFNs should be treated like conventional debt in Miller model calculations .

24. Q. Please respond to Mr. Thone's assertion that in Docket 98-0319, ComEd's petition to issue securitized notes, "Staff strongly argued that the TFNs had to be included as debt and consequently all leverage calculations were made with TFNs included."

A. I was not involved in Docket No. 98-0319 and I am unaware of any such argument from Staff. Moreover, I have found no such evidence of that argument in either Staff testimony or briefs. Nevertheless, had I been the Staff witness in that proceeding, I too would have argued for including the TFNs in ComEd's Miller model analysis.

25. Q. Please explain why your statement does not contradict your position that one of the flaws in ComEd's Miller and Hamada model analyses is its failure to recognize differences in conventional debt, TFNs, and tax-exempt debt.

A. As previously noted, ComEd had the burden of reasonably demonstrating that issuing TFNs for the purposes specified would reduce ComEd's cost of capital. My recollection is that ComEd at first proposed to meet this burden solely with qualitative testimony that described the differences between TFNs and conventional debt and why

[27] Staff Ex. 5.0, pp. 39-40.
[28] 220 ILCS 5/18-103(d)(1)(A).

those differences would lead to a lower overall cost of capital. In my judgment, such a qualitative approach is insufficient for reasonably demonstrating the effect of the issuance of TFNs and their proposed use on a utility's cost of capital. Therefore, I would have requested a quantification of the impact of the TFNs on cost of capital in some manner. Despite its shortcomings, I would support performing that quantitative analysis with some form of the Miller model if the TFNs were treated as conventional debt. The difference in the objectives of a proceeding under Section 18-103(d)(1)(A) of the Illinois Public Utilities Act[29] and a rate proceeding dictates differences in the application of the ComEd Miller model. In the latter proceeding, the Commission must determine a rate of return that balances the interests of investors and ratepayers. In the former proceeding, the Commission is charged with making a yes or no determination on whether the utility's proposed use of proceeds would reduce the utility's cost of capital.

In determining whether a utility may issue TFNs pursuant to Subsection 18-103(d)(1)(A), two types of errors could occur. First, the Commission might authorize a utility to issue TFNs based on some form of a quantitative analysis; although, the TFN issuance would actually ~~increase~~ that utility's cost of capital.[30] Alternatively, the Commission might reject a utility's request to issue TFNs based on some form of quantitative analysis; although, the TFN issuance would actually ~~decrease~~ that utility's cost of capital.[31] The language in Subsection 18-103(d)(1)(A) suggests to me that the acceptance error is more of a concern. In other words, overstating the impact of the TFN issuance on financial leverage is a more acceptable error than understating that impact.

[29] 220 ILCS 5
[30] Hereafter referred to as "acceptance error."
[31] Hereafter referred to as "rejection error."

Although one can argue, as ComEd did, that TFNs and conventional debt are not equivalent from a financial risk perspective, excluding TFNs from a Miller or Hamada model analysis implausibly implies that TFNs have no debt-like properties at all. This suggests that at a minimum, TFNs would have to be converted into some form of conventional debt equivalent. Nevertheless, determining the appropriate conversion factor (e.g., $0.80 of conventional debt equivalent for every $1 of TFNs) would be problematic and controversial.[32] Therefore, if a utility's proposed TFN issuance could be reasonably shown to reduce its cost of capital even when the TFNs are treated the same as conventional debt, then it follows that utility would have reasonably shown that its proposed TFN issuance would reduce its cost of capital had the TFNs been treated in an arguably more appropriate manner: for example, as a fractional equivalent of conventional debt from a financial leverage perspective. Thus, treating the TFNs as conventional debt in Docket No. 98-0319 was a conservative assumption that reduced the chance that the Commission would authorize ComEd's proposed TFN issue under circumstances in which the TFN issue actually increased ComEd's cost of capital. Despite this conservative assumption, ComEd was still able to reasonably demonstrate that its TFN proposal would reduce ComEd's cost of capital. In contrast, in this proceeding ComEd seeks to charge ratepayers with the costs implied in that conservative assumption used to determine whether ComEd would be permitted to issue TFNs; that is, as if TFNs were conventional debt despite the fact that ComEd argued that TFNs were less of a burden than conventional debt.[33]

[32] The conversion factor of $0.80 of conventional debt equivalent for every $1 of TFNs is presented for explanatory purposes only. It does not represent a proposed conversion ratio for the purpose of implementing ComEd's Miller and Hamada model analyses in this proceeding.

[33] Order, Docket No. 98-0319, July 21, 1998 at 22.

26. Q. What is your response to Mr. Thone's assertions that "the multitude of academic and economic scholars who have studied the Miller model agree with it."[34]

A. Such broad generalizations are easy to state, difficult to prove, and usually misleading. For example, *Brigham and Gapenski* state:

> [B]oth academicians and financial executives have voiced concern over the validity of the MM and Miller models, and virtually no one believes they hold precisely. The MM zero-tax model leads to the conclusion that capital structure doesn't matter, yet we observe systematic capital structure patterns within industries. Further, when used with "reasonable" tax rates, both the MM model with corporate taxes and the Miller model lead to the conclusion that firms should use 100 percent debt financing, but virtually no firms deliberately go to that extreme.[35]

27. Q. Are you implying that the MM propositions on which the Miller and Hamada models are based are unimportant to understanding the relationship between capital structure and cost of capital?

A. No. As *Brealey and Myers* state:

> We believe that in practice capital structure *does* matter, but we nevertheless devote all of this chapter to MM's argument [that capital structure does not affect the value of a firm or cost of capital]. If you don't fully understand the conditions under which MM's theory holds, you won't fully understand why one capital structure is better than another. The financial manager needs to know what kinds of market imperfections to look for.[36]

In other words, by addressing the circumstances under which capital structure does not matter, MM's theory helps one to understand the conditions under which capital structure does matter. In fact, this is how Miller himself viewed the MM contribution to

[34] ComEd Ex. 30.0, p. 12.
[35] *Emphasis added*, *Brigham and Gapenski*, pp. 634-635.
[36] *Emphasis in original*, *Brealey and Myers*, p. 474.

capital structure theory.[37] The ComEd Miller and Hamada models clearly show that the assumed cost of debt and the measurement of financial leverage ~~do~~ matter to those models' results.

RESPONSE TO DR. PELTZMAN

28. Q. Please respond to Dr. Peltzman's assertion that credit rating agencies are primarily concerned with default risk, which he implies differs from the risks of an equity investment.[38]

A. In Docket No. 98-0319, ComEd witness William A. Abrams, formerly a Vice President of Duff & Phelps, "Credit ratings are used regularly by equity investors to define and limit risk targets."[39] I agree with Mr. Abrams. Although debt and common equity investors may not view changes in the operating environment as affecting the risk of debt and common equity securities to the same magnitude, the implication that debt and equity investors could view industry restructuring as having ~~opposite~~ effects on the risk of their holdings is simply not credible.

The issue is whether ComEd's operating risk has increased or decreased as a result of changes in its corporate structure and the law under which it operates. In contrast, corporate credit ratings reflect both operating and financial risk. Thus, an S&P credit rating may increase as a result of a decrease in financial risk rather than an increase in operating risk. S&P did not clearly state the reason for its decision to upgrade ComEd's credit rating; however, the concurrent jump from 7 to 4 in S&P's operating

[37] Miller, "The Modigliani-Miller Propositions After Thirty Years," Journal of Economic Perspectives, vol. 2, no. 4, Fall 1998, p. 100.
[38] ComEd Ex. 29.0, p. 6.
[39] Docket No. 98-0319, ComEd Ex. 8.0, p. 5.

risk measure, the business position rating, clearly indicates that a decline in operating risk was a contributing factor.[40]

Although S&P's business position rating measures operating risk, the business position rating must be regarded as a proxy for the unobservable market consensus operating risk inherent in a common equity investment. Like all proxies, business position ratings are susceptible to measurement error. Similarly, the opinions of Dr. Peltzman and Dr. Culp must be regarded as flawed proxies for investor perceptions of ComEd's operating risk. Clearly the opinions of Dr. Peltzman and Dr. Culp are at odds with S&P. With all due respect to those gentlemen, due to S&P's independence and experience in analyzing the risk of utilities, I must recommend that the Commission place much higher value on S&P's corporate credit and business position ratings than on the opinions of Dr. Peltzman and Dr. Culp.

29. Q. Does this conclude your testimony?

A. Yes, it does.

[40] *Standard & Poor's Utilities and Perspectives*, October 23, 2000.

Mathematical Proof of the Implications of ComEd Miller Model on Optimal Capital Structure

Commonwealth Edison Company

The ComEd Miller model presents the relationship between financial leverage and the cost of common equity as follows:

$$k_{e,l} = k_u + (k_u - k_d)\left(\frac{D}{E}\right)(1-T) \tag{1}$$

where: $k_{e,l}$ = cost of common equity for a levered firm;

k_u = cost of capital for an unlevered firm;

k_d = cost of total debt, including short-term debt;

D = amount of debt;

E = amount of common equity; and

T = corporate income tax rate.

The after-tax weighted cost of capital k_{WACC} is as follows:

$$k_{WACC} = k_{e,l}\left(\frac{E}{D+E}\right) + k_d\left(\frac{D}{D+E}\right)(1-T) \tag{2}$$

Substituting Equation (1) for $k_{e,l}$ in Equation (2) produces the following:

$$k_{WACC} = \left[k_u + (k_u - k_d)\left(\frac{D}{E}\right)(1-T)\right]\left(\frac{E}{D+E}\right) + k_d\left(\frac{D}{D+E}\right)(1-T) \tag{3.1}$$

First, multiply ComEd Miller model equation with the equity ratio $\left(\frac{E}{D+E}\right)$:

$$k_{WACC} = k_u\left(\frac{E}{D+E}\right) + (k_u - k_d)\left(\frac{D}{E}\right)(1-T)\left(\frac{E}{D+E}\right) + k_d\left(\frac{D}{D+E}\right)(1-T) \tag{3.2}$$

Simplifying the term $(k_u - k_d)\left(\frac{D}{E}\right)(1-T)\left(\frac{E}{D+E}\right)$ results in:

Mathematical Proof of the Implications of ComEd Miller Model on Optimal Capital Structure

$$k_{WACC} = k_u\left(\frac{E}{D+E}\right)+(k_u - k_d)(1-T)\left(\frac{D}{D+E}\right)+k_d\left(\frac{D}{D+E}\right)(1-T) \quad (3.3)$$

Applying the distributive property on the term $(k_u - k_d)(1-T)\left(\frac{D}{D+E}\right)$ produces:

$$k_{WACC} = k_u\left(\frac{E}{D+E}\right)+k_u(1-T)\left(\frac{D}{D+E}\right)-k_d(1-T)\left(\frac{D}{D+E}\right)+k_d\left(\frac{D}{D+E}\right)(1-T) \quad (3.4)$$

The sum of the last two terms $k_d(1-T)\left(\frac{D}{D+E}\right)$ equal zero, leaving:

$$k_{WACC} = k_u\left(\frac{E}{D+E}\right)+k_u(1-T)\left(\frac{D}{D+E}\right) \quad (3.5)$$

Applying the distributive property result in:

$$k_{WACC} = k_u\left[\left(\frac{E}{D+E}\right)+(1-T)\left(\frac{D}{D+E}\right)\right] \quad (3.6)$$

Multiplying the terms $(1-T)$ and $\left(\frac{D}{D+E}\right)$ produces:

$$k_{WACC} = k_u\left[\left(\frac{E}{D+E}\right)+\left(\frac{D}{D+E}\right)-T\left(\frac{D}{D+E}\right)\right] \quad (3.7)$$

Since $\left(\frac{E}{D+E}\right)+\left(\frac{D}{D+E}\right)=1$ then:

$$k_{WACC} = k_u\left[1-T\left(\frac{D}{D+E}\right)\right] \quad (3)$$

Examples of the Impact of the Interest Rate Assumption on Cost of Common Equity estimates using the ComEd Miller Model

Commonwealth Edison Company

For all examples, unlevered cost of capital k_d equals 10%, the debt to equity ratio $\frac{D}{E}$ equals 1 and the tax rate T equals 40%.

The ComEd Miller model presents the relationship between financial leverage and the cost of common equity $k_{e,l}$ as follows:

$$k_{e,l} = k_u + (k_u - k_d)\left(\frac{D}{E}\right)(1-T) \quad (1)$$

Example A: Conventional Debt Bearing an 8% Interest Rate

$k_{e,l}$ = 10% + (10% - 8%) × 1 × (1 - 40%) = 11.2%

Example B: Transitional Funding Notes Bearing a 6% Interest Rate

$k_{e,l}$ = 10% + (10% - 6%) × 1 × (1 - 40%) = 12.4%

Example C: Tax-Exempt Debt Bearing a 5% Interest Rate

$k_{e,l}$ = 10% + (10% - 5%) × 1 × (1 - 40%) = 13.0%